Proximate Analysis

Prof Herb Ockerman 1960’ 2X2 slides
some script added in 15’

PROXIMATE ANALYSIS

PERCENT MOISTURE

PERCENT FAT

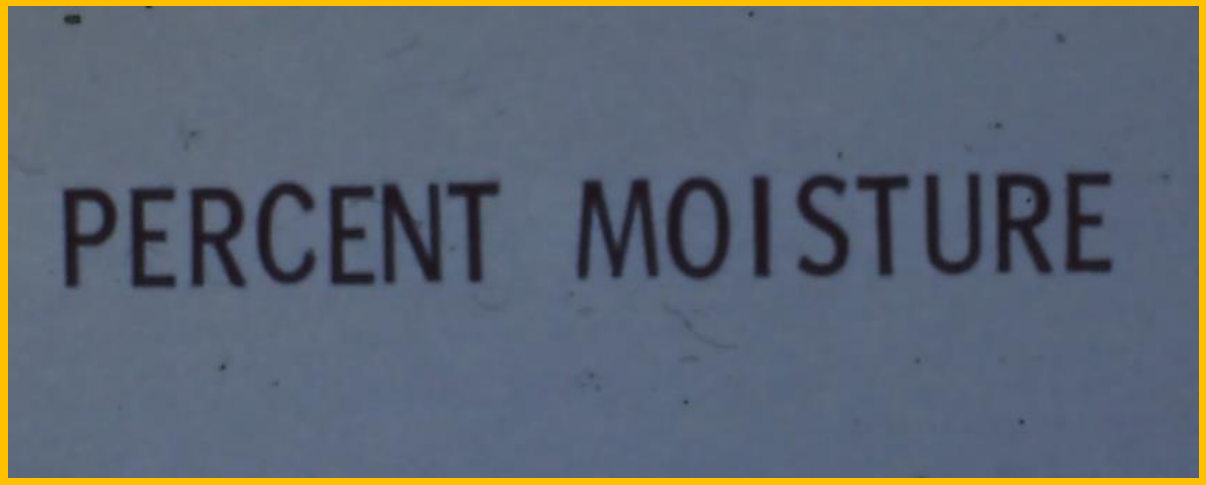
PERCENT PROTEIN

PERCENT ASH

SAMPLING

Mix well so that the sample will represent the total

Also mix sample well

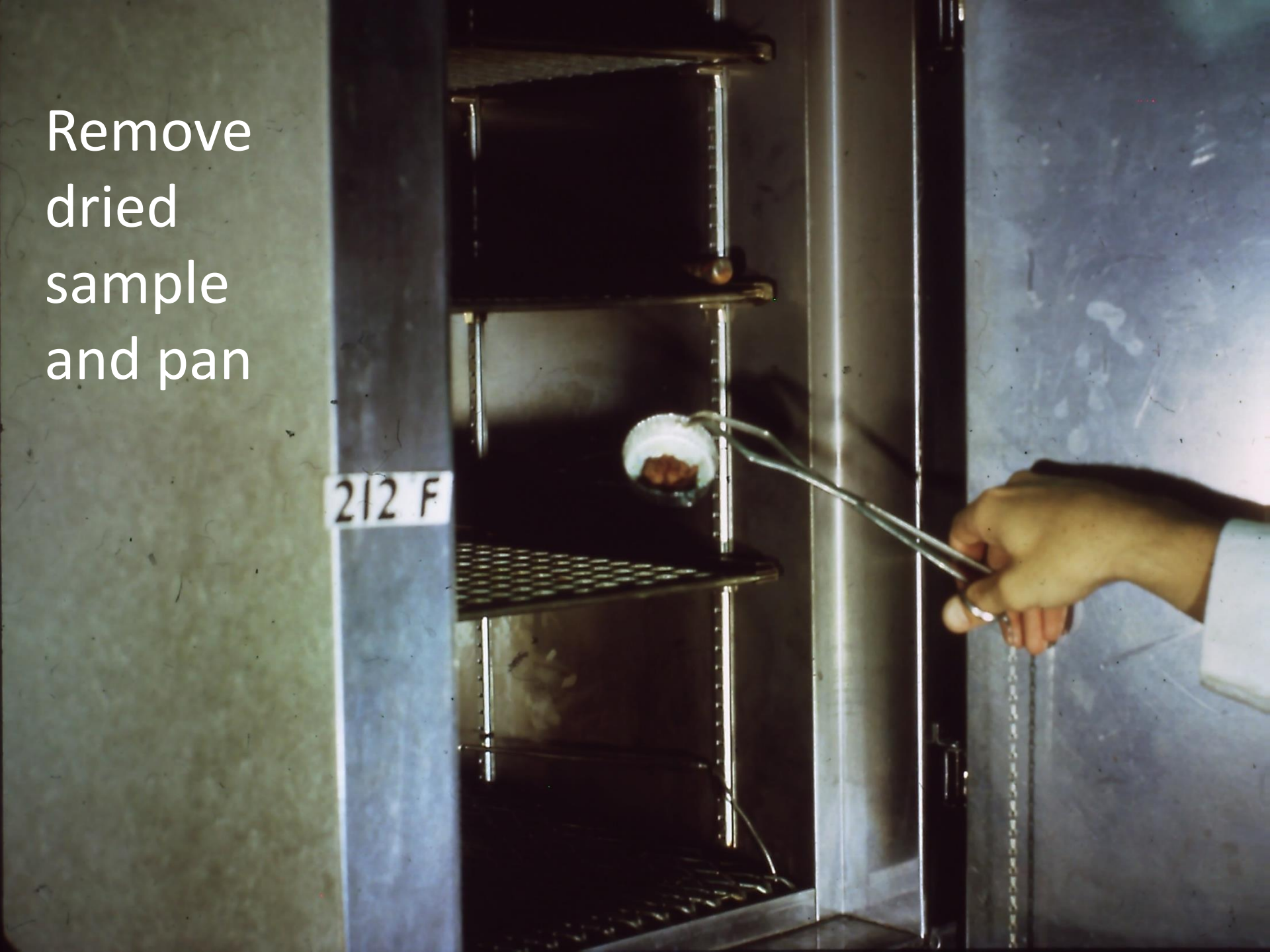

PERCENT MOISTURE

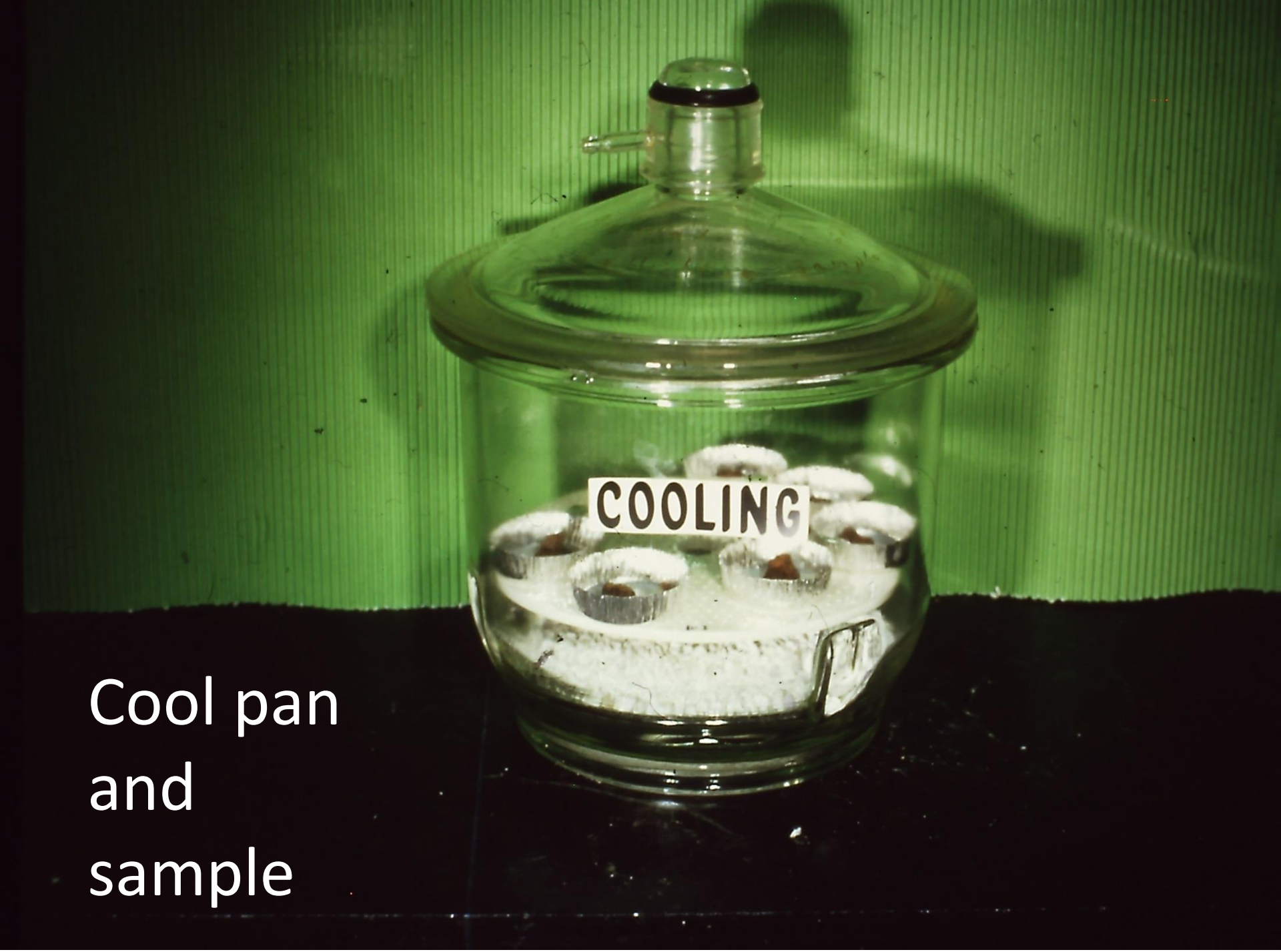

Weigh
pan and
sample


212°F
Dry
sample

18 HOURS

Remove dried sample and pan





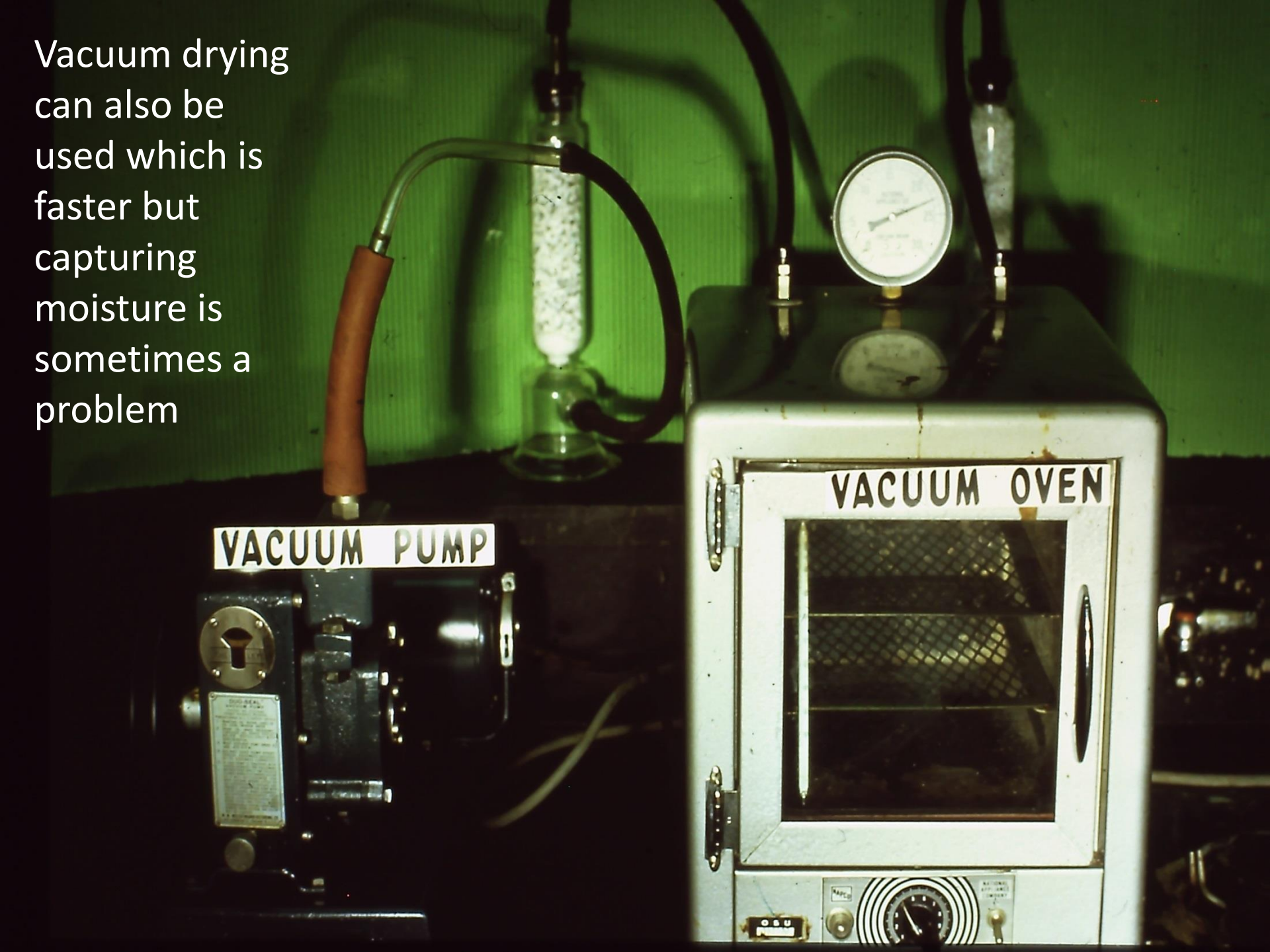
Cool pan and sample


Weigh
cooled
pan and
sample
RIGHT-A-WEIGH.

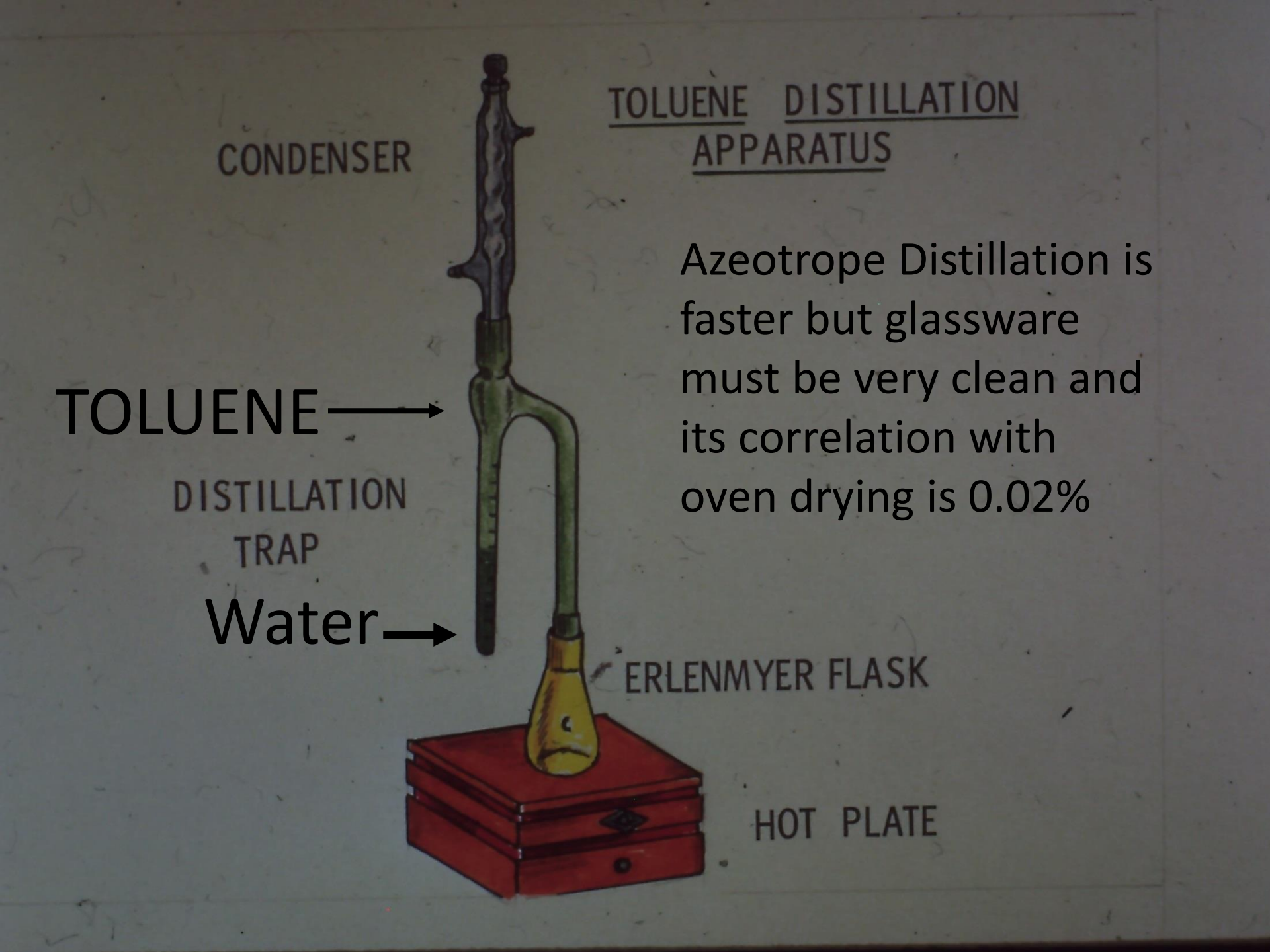
MOISTURE DETERMINATION

(1) 10g Wet wt.
5g Dry wt.
5g Loss in wt.

(2) $\frac{5.00}{10} = .50 = 50\%$ Moisture



Vacuum drying can also be used which is faster but capturing moisture is sometimes a problem

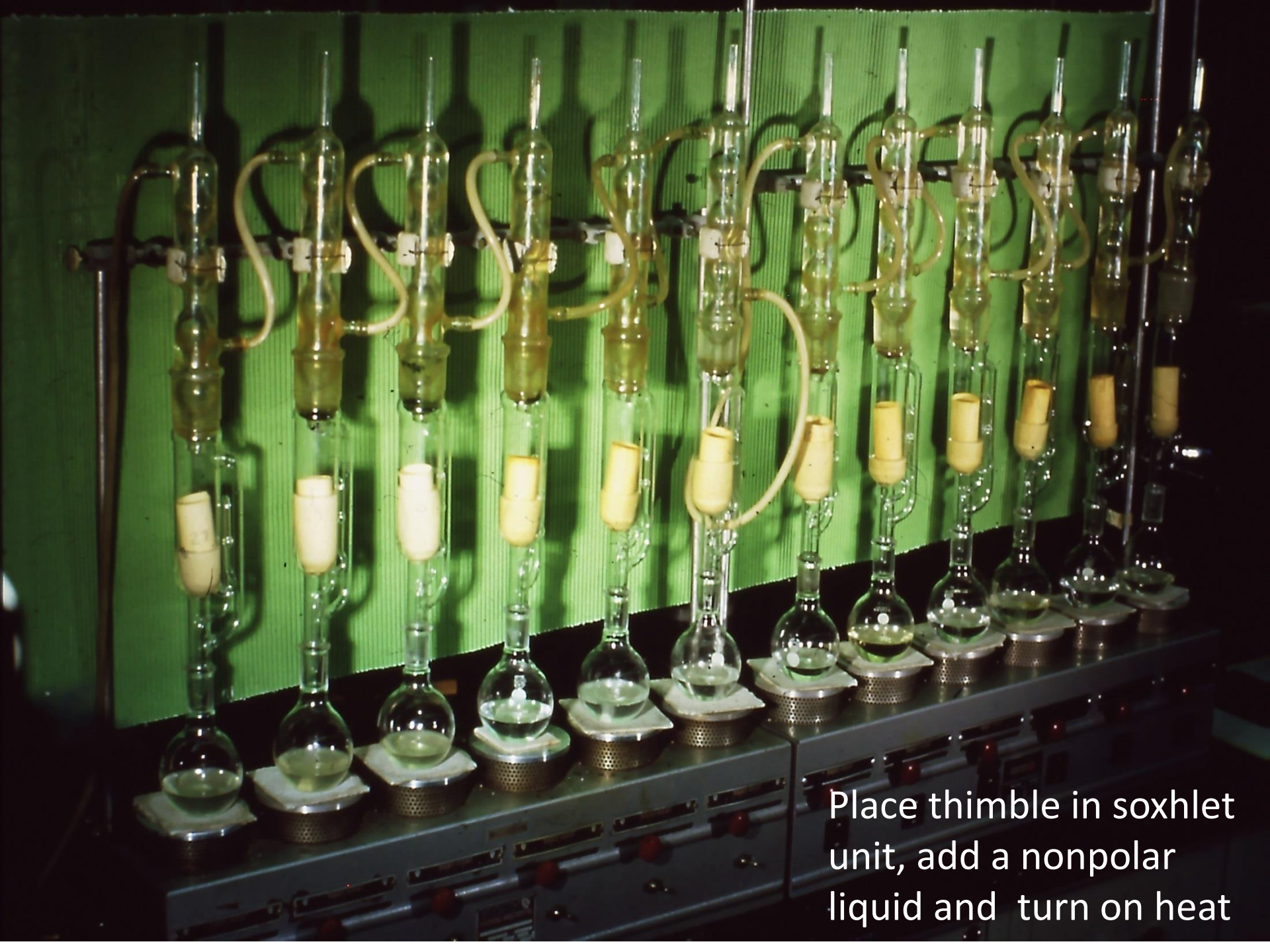


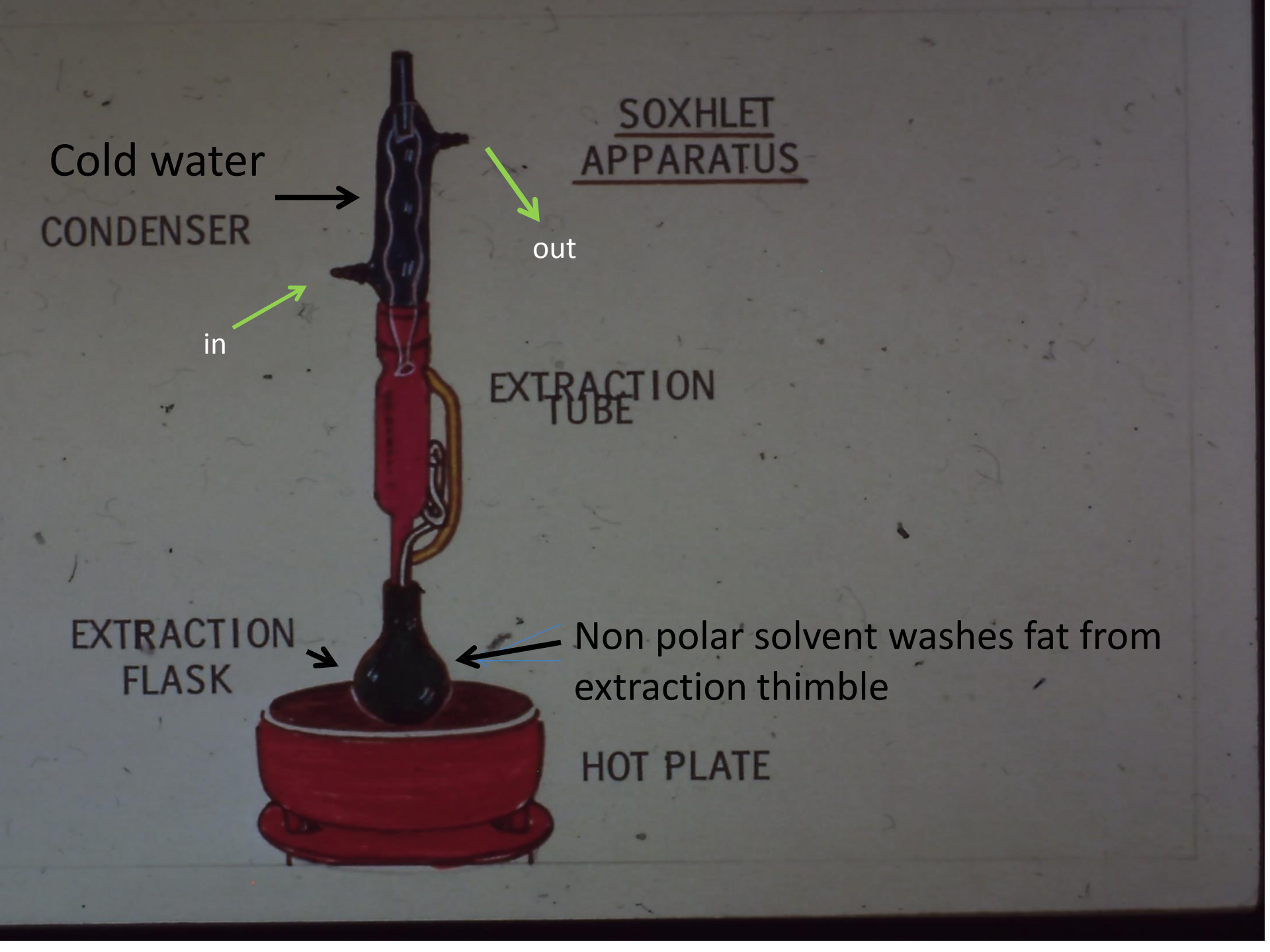
Azeotrope Distillation is faster but glassware must be very clean and its correlation with oven drying is 0.02%

PERCENT CRUDE FAT

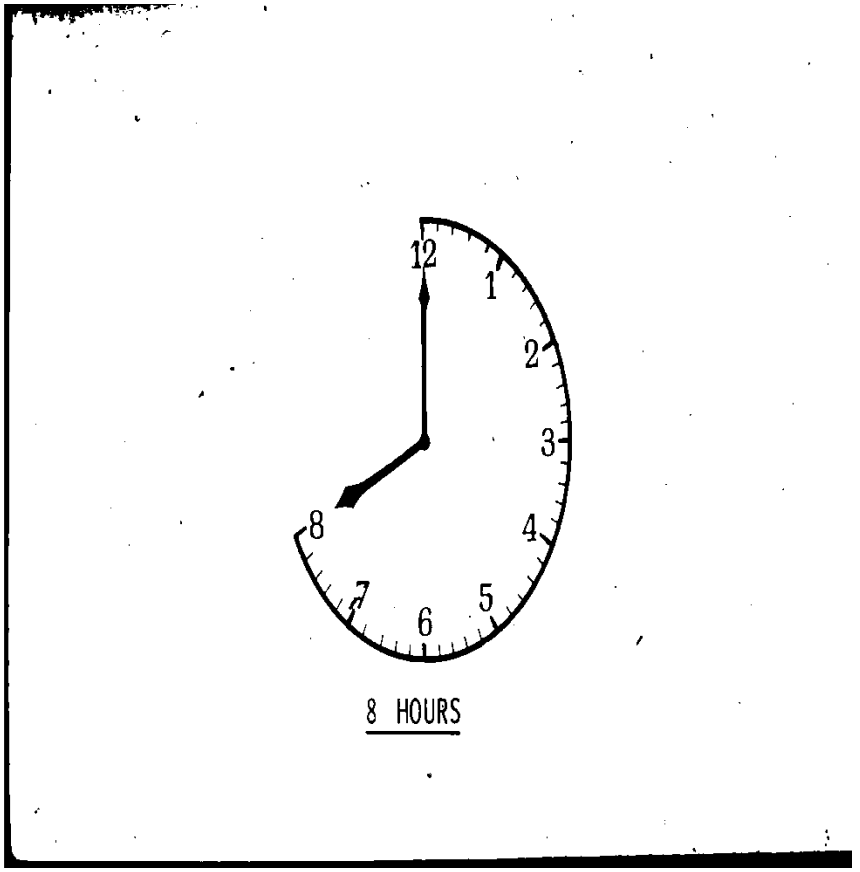
(ETHER EXTRACT)

Transfer dried sample into porous thimble using a non-porous liquid (ether often used)


Place thimble in soxhlet unit, add a nonpolar liquid and turn on heat


SOXHLET APPARATUS
Cold water
CONDENSER
out
in
EXTRACTION TUBE
EXTRACTION FLASK
Non polar solvent washes fat from extraction thimble
HOT PLATE

Wash the fat from the sample with a nonpolar solvent for



Remove thimble containing washed sample from extraction unit and dry the sample in a drying oven

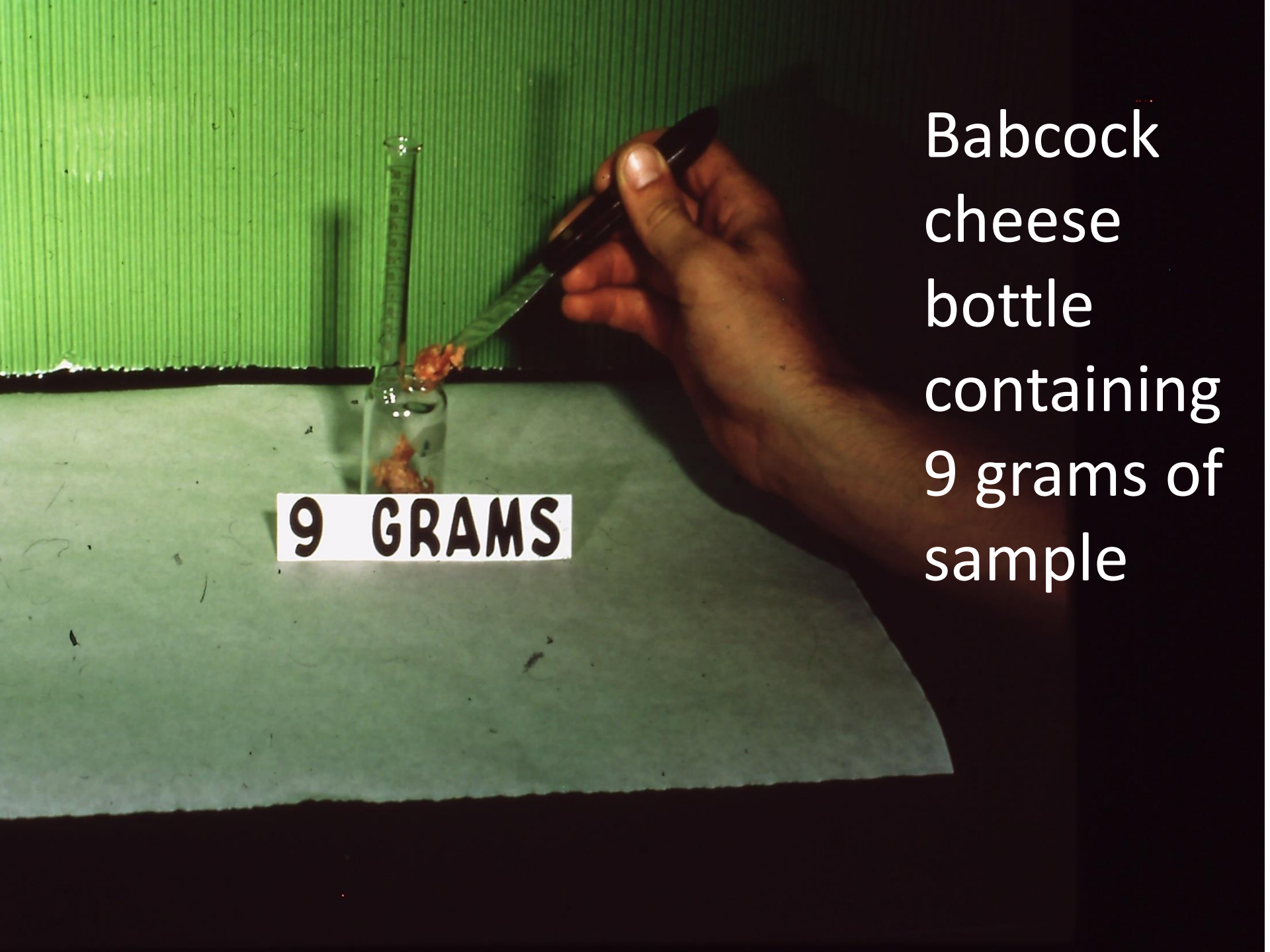
Weigh thimble and washed sample

FAT EXTRACTION

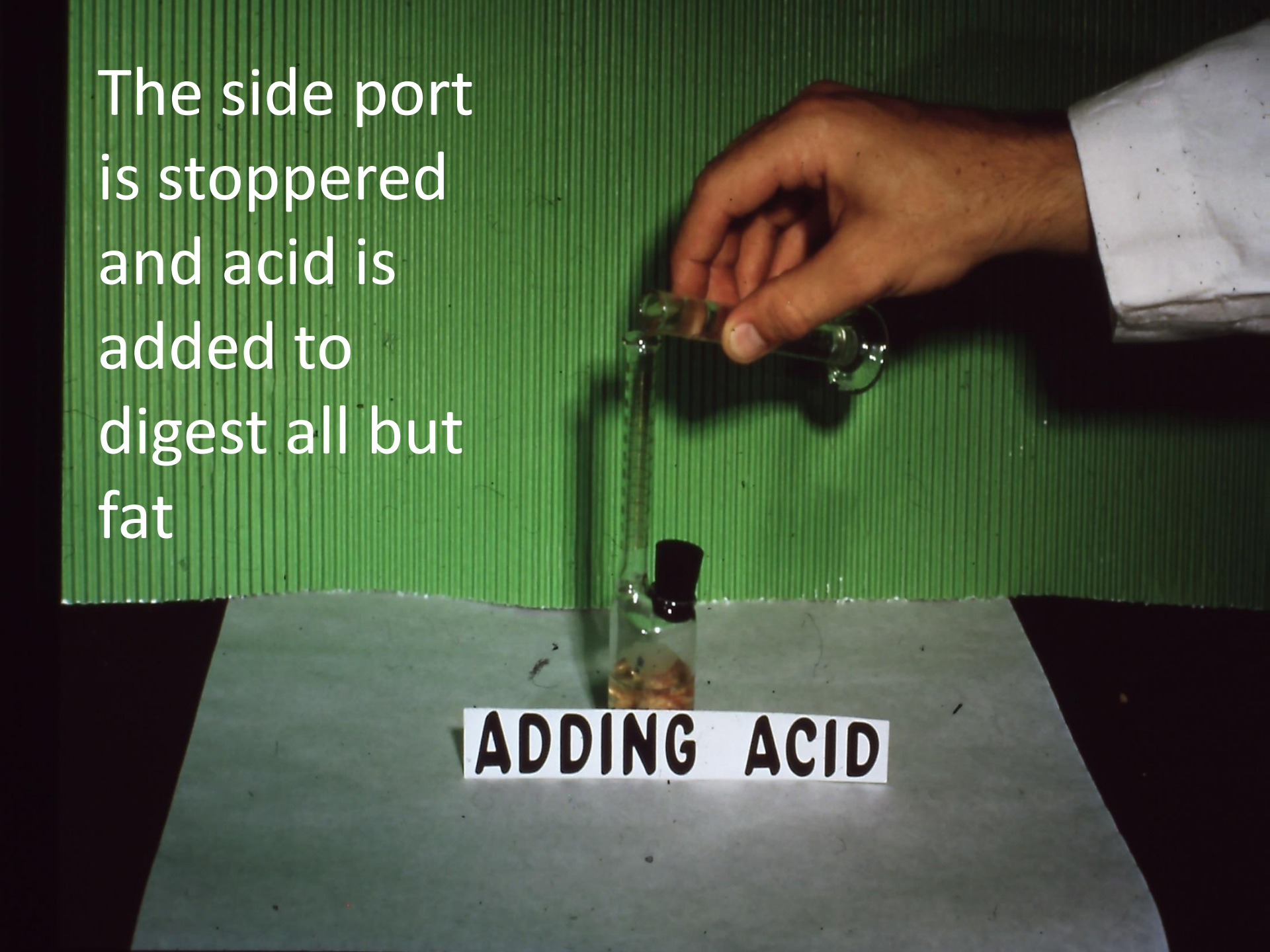
(1) 10g Wet wt.

5g Dry wt.
2g Extracted wt.
3g Loss in wt.

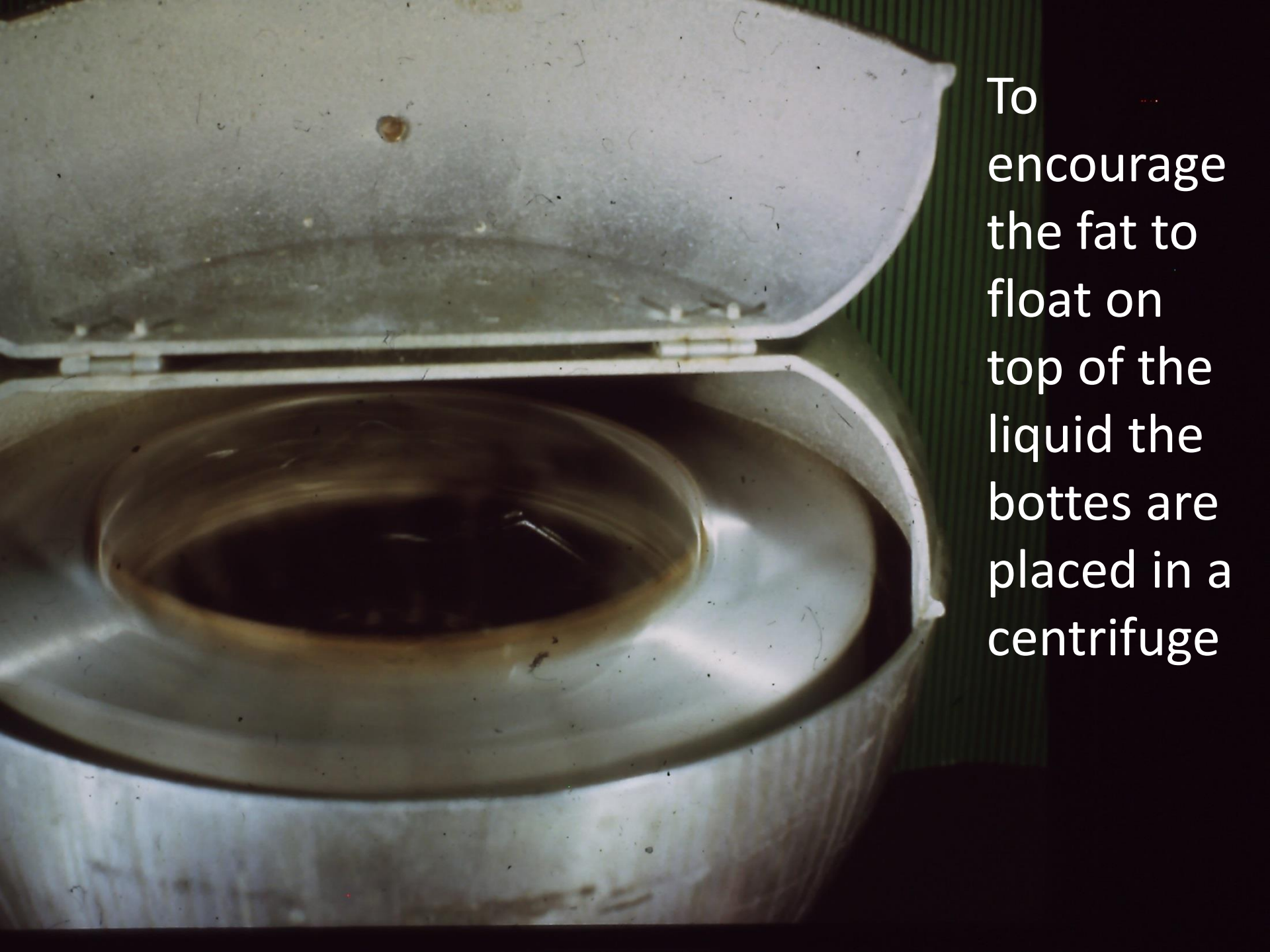
(2) .30 = 30% Fat
10/3.00



Babcock cheese bottle containing 9 grams of sample

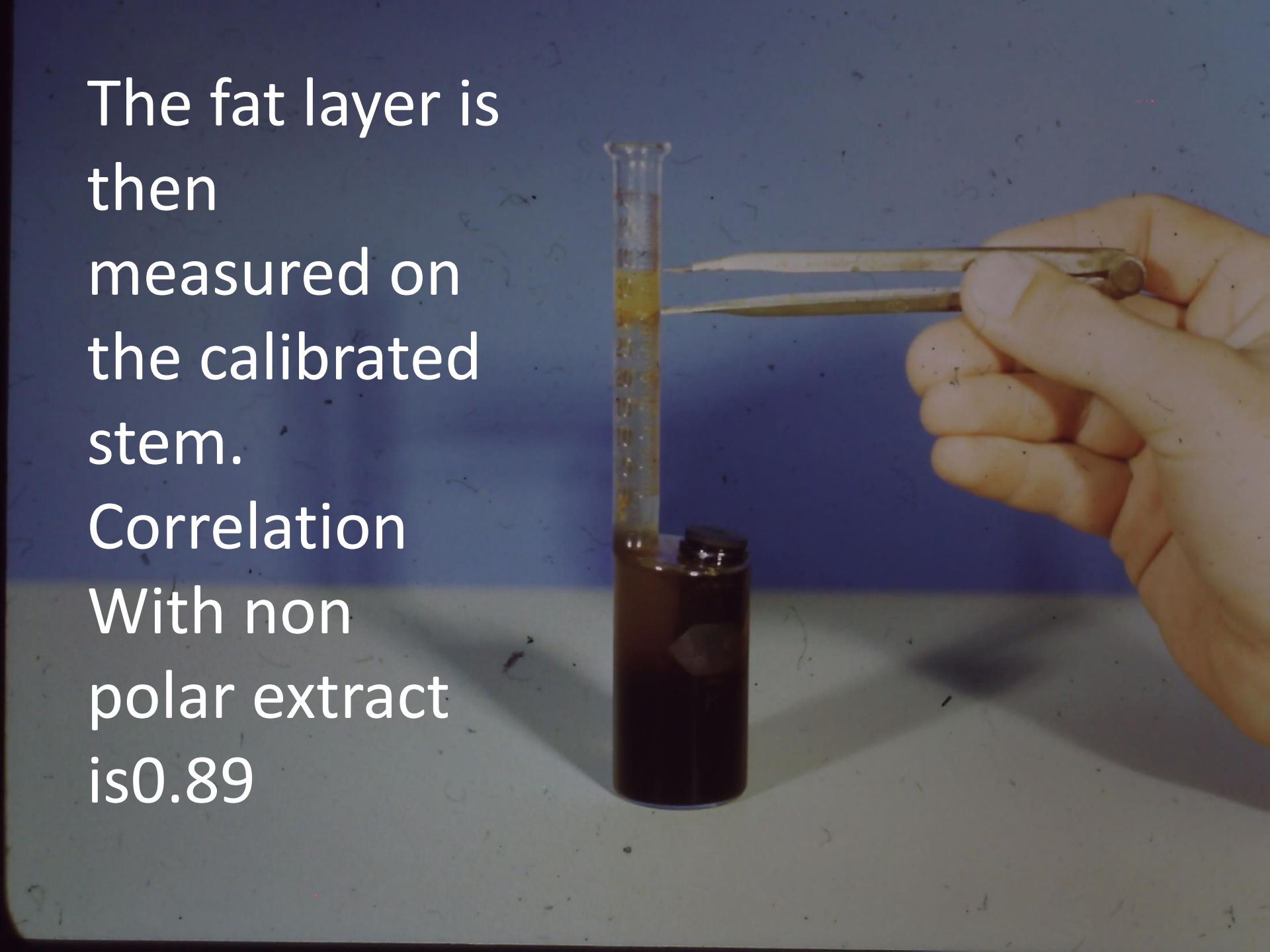

The side port is stoppered and acid is added to digest all but fat
ADDING ACID

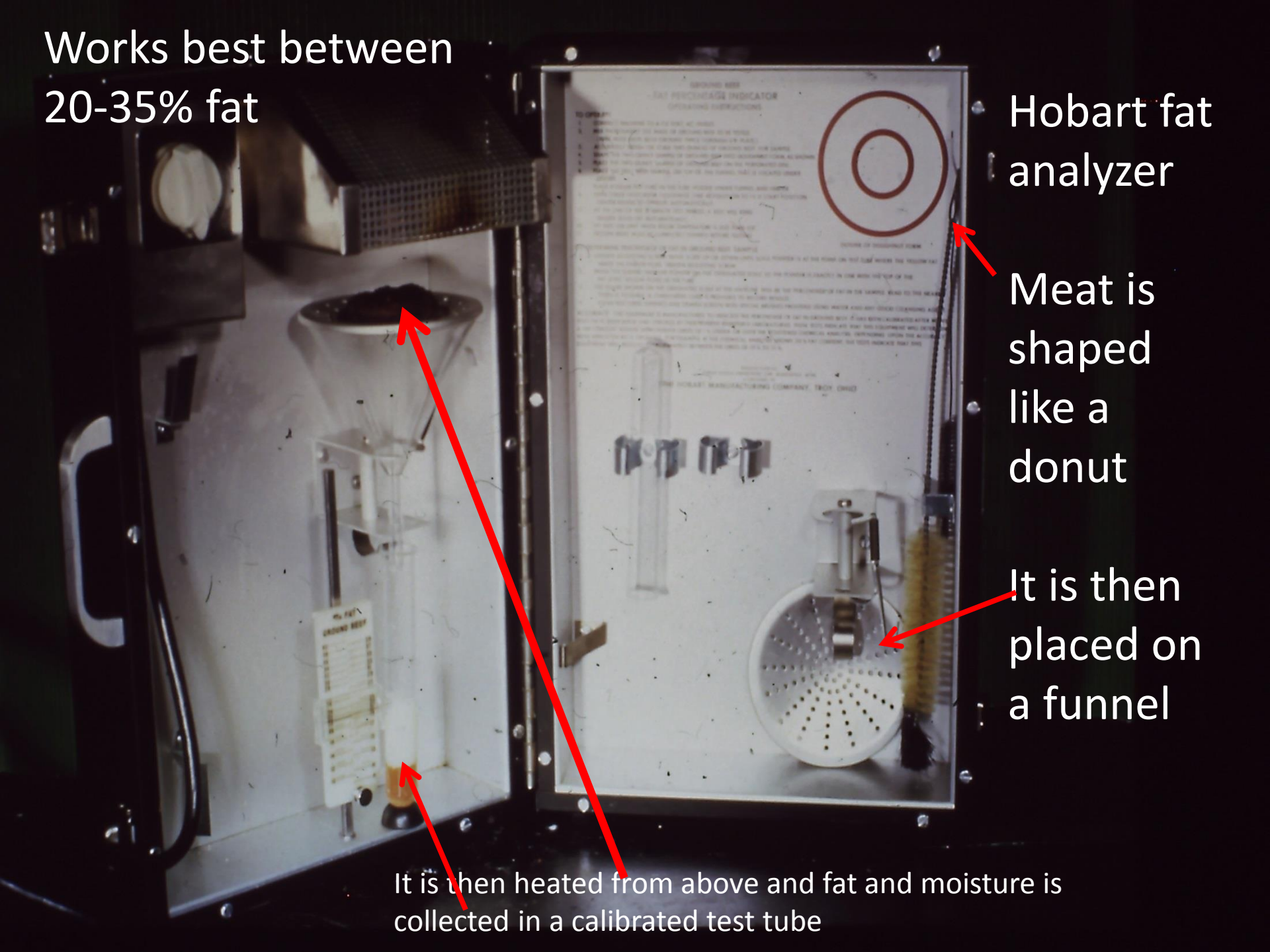
To aid digestion the meat acid mixture is heated

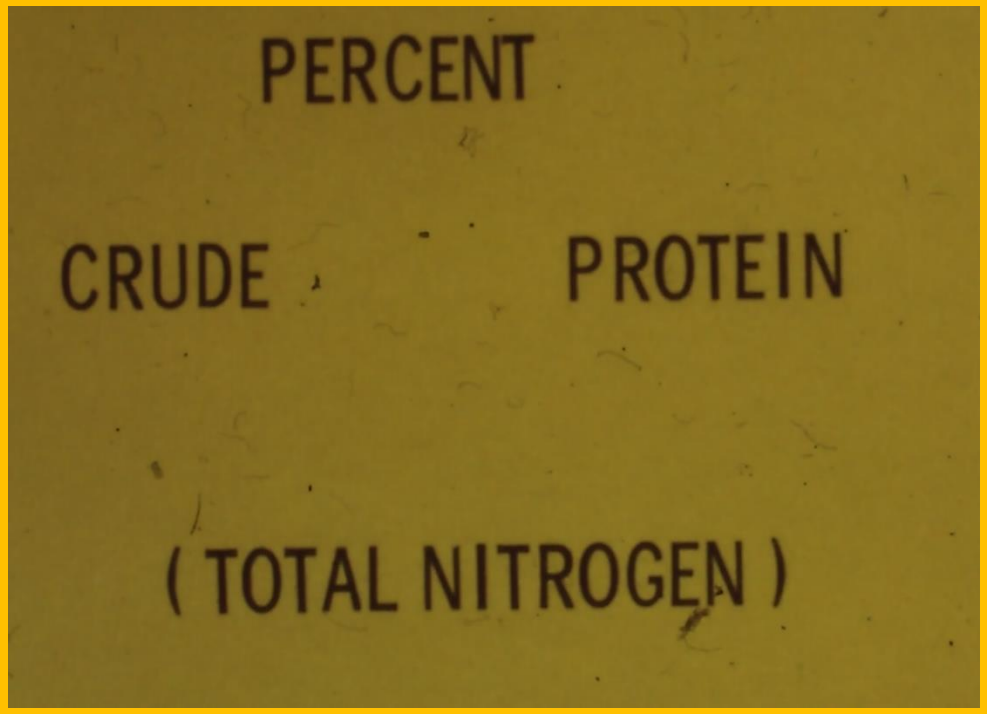


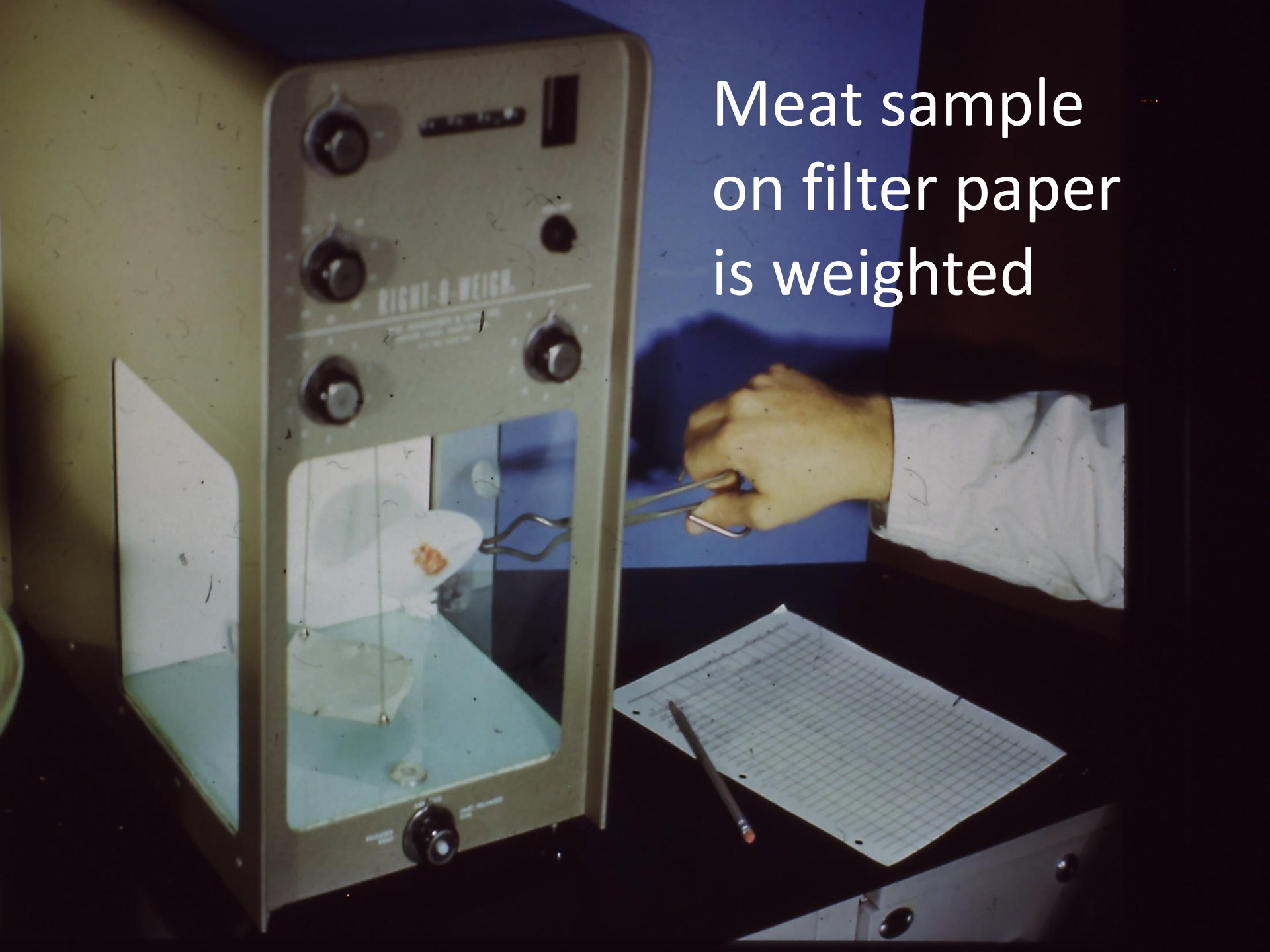
To encourage the fat to float on top of the liquid the bottes are placed in a centrifuge

The fat layer is then measured on the calibrated stem. Correlation With non polar extract is0.89

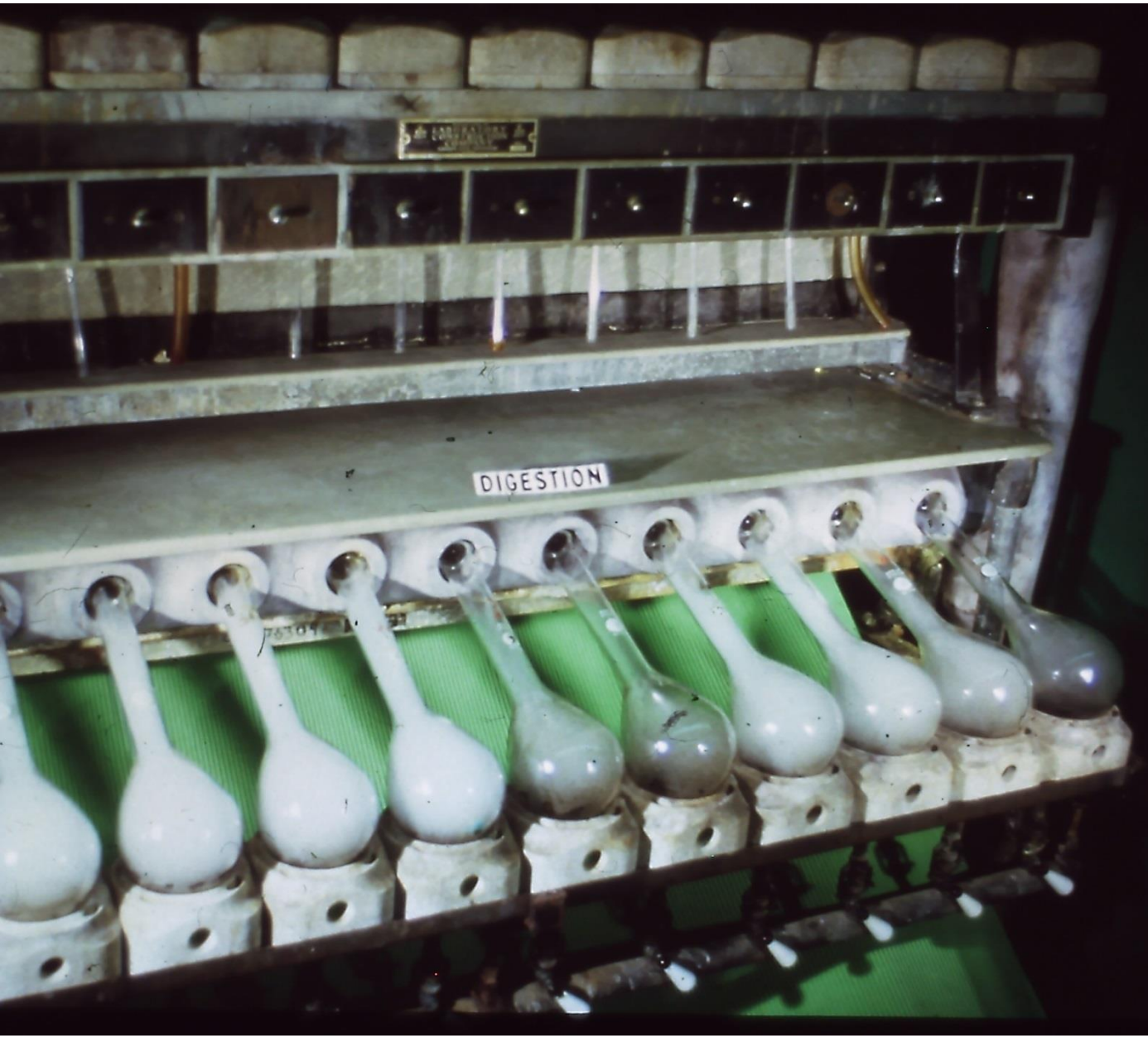



Works best between 20-35% fat
Hobart fat analyzer
Meat is shaped like a donut
It is then placed on a funnel
It is then heated from above and fat and moisture is collected in a calibrated test tube

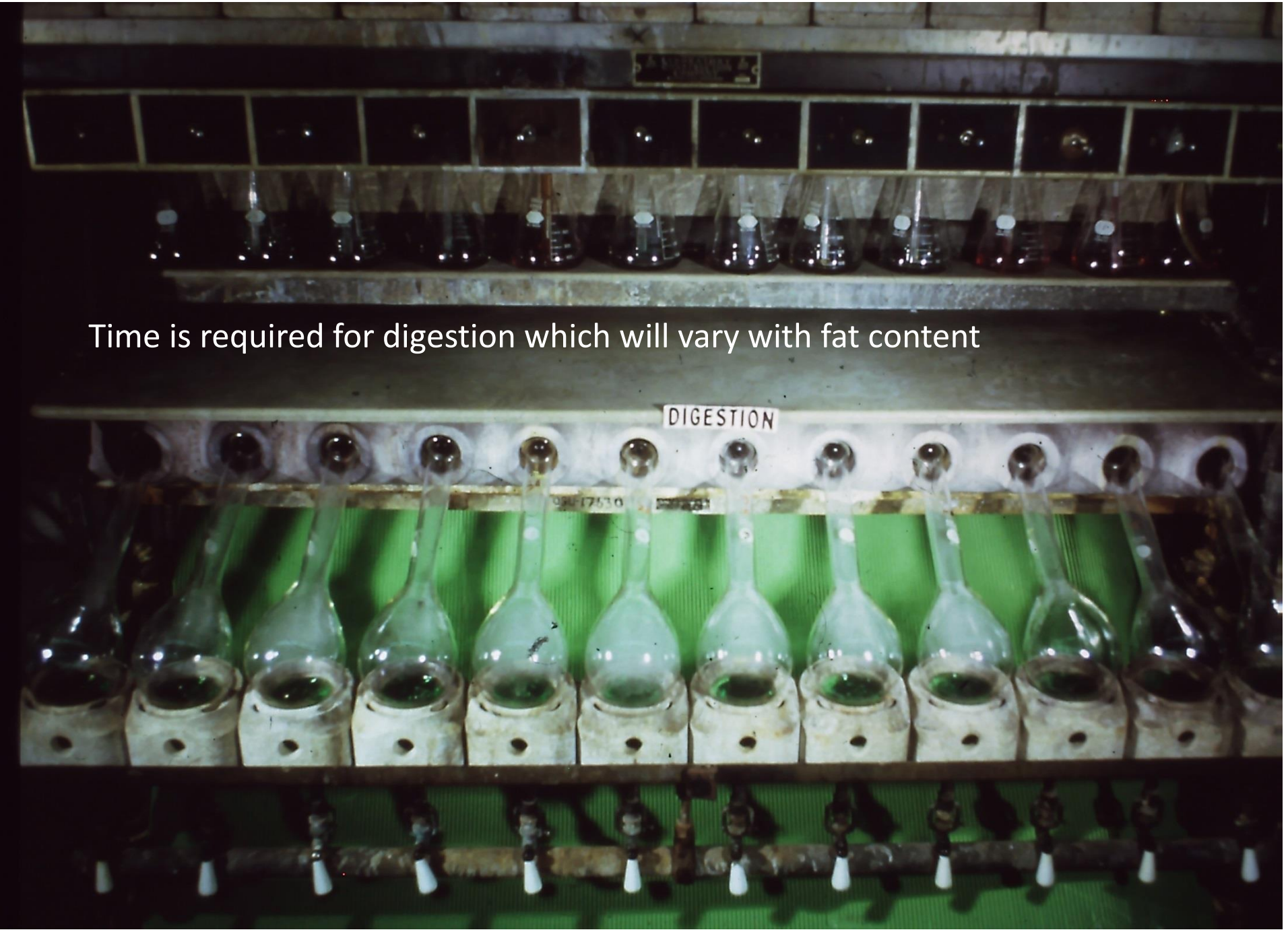

PERCENT
CRUDE PROTEIN
(TOTAL NITROGEN)


Meat sample
on filter paper
is weighted

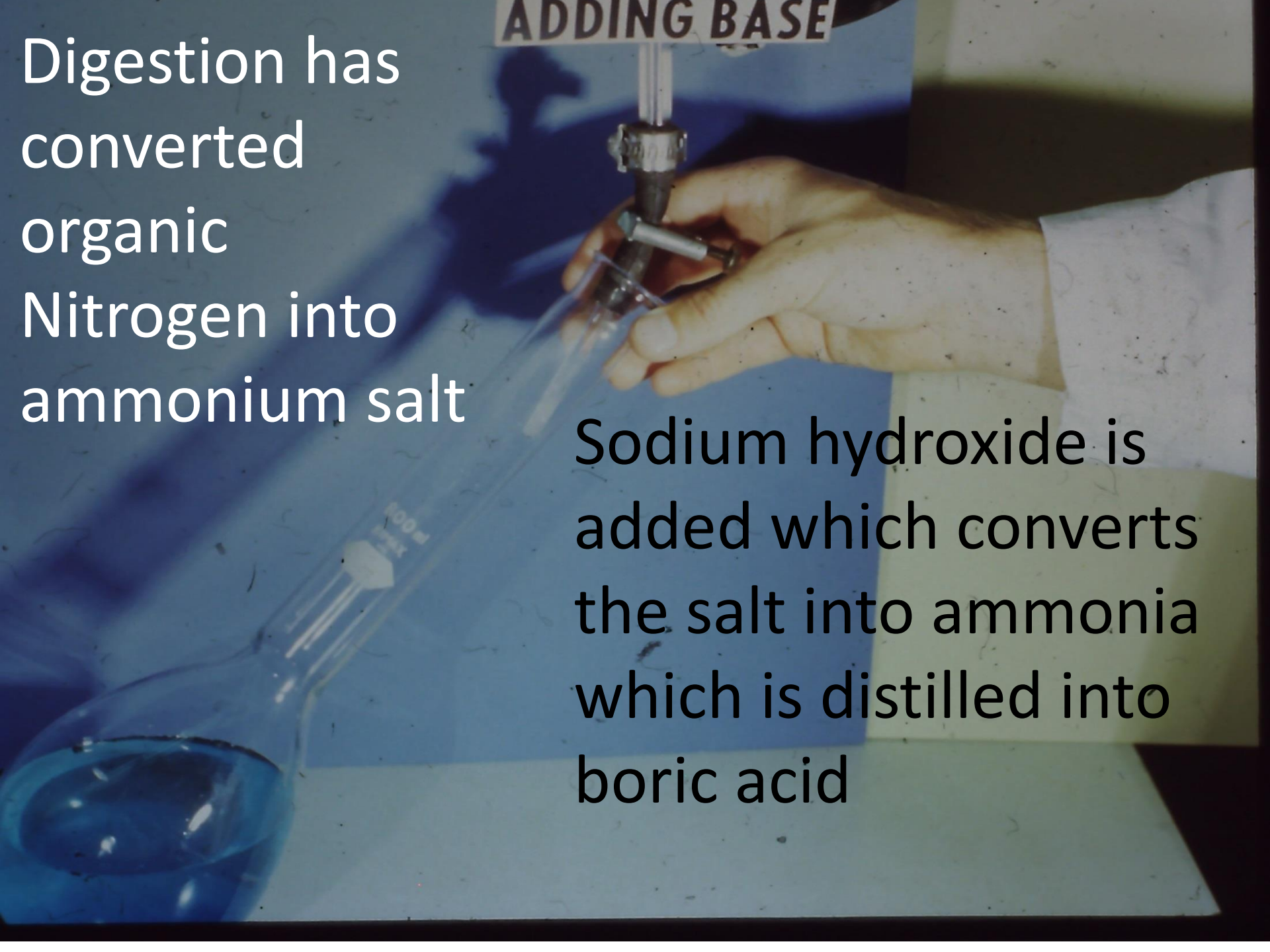
Meat and filter paper is placed in a Keldahl flask



A Catalyst & Sulfuric acid is added to the flask and with the aid of heat digestion occurs



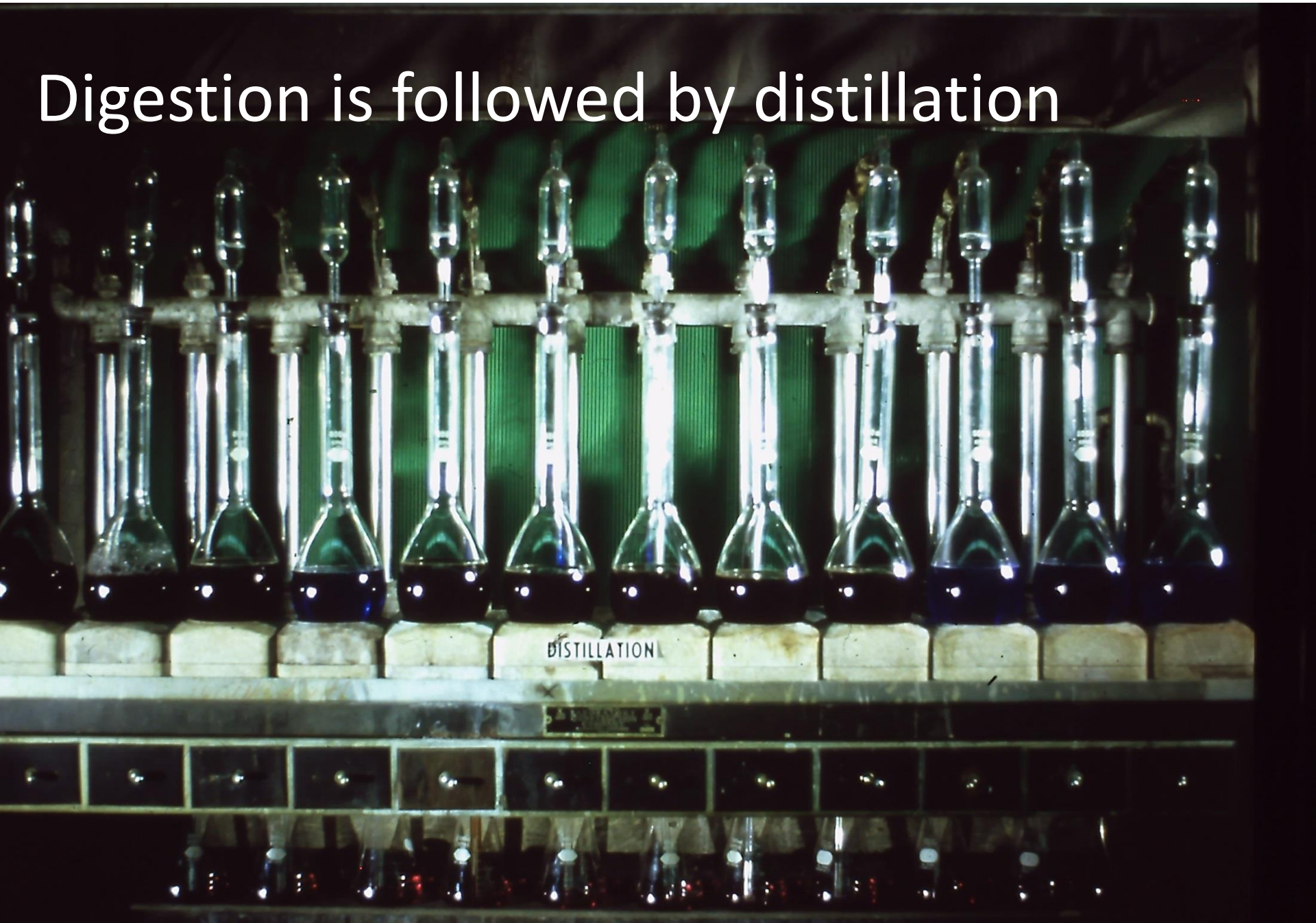
Time is required for digestion which will vary with fat content



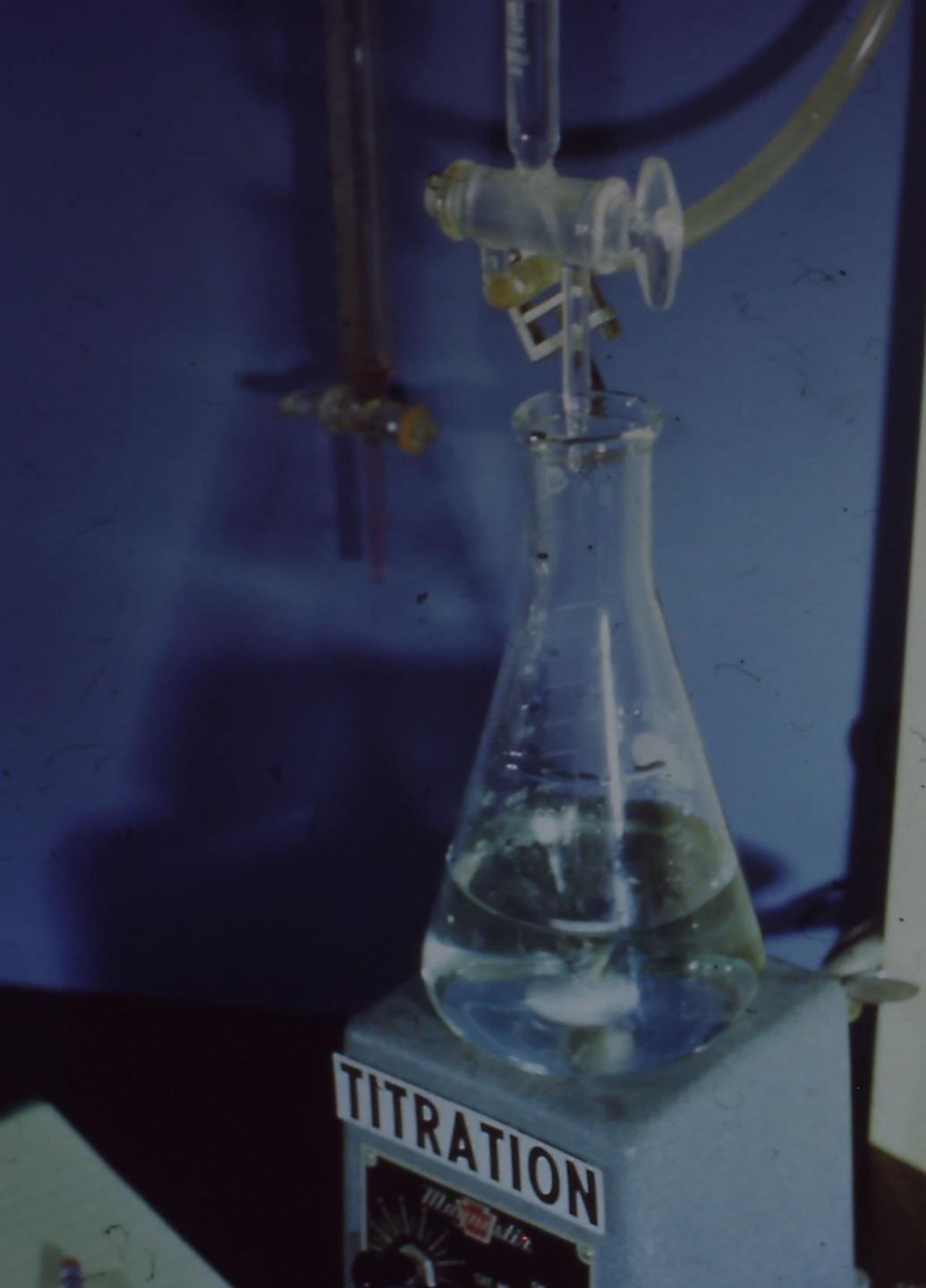
Digestion has converted organic Nitrogen into ammonium salt

Sodium hydroxide is added which converts the salt into ammonia which is distilled into boric acid

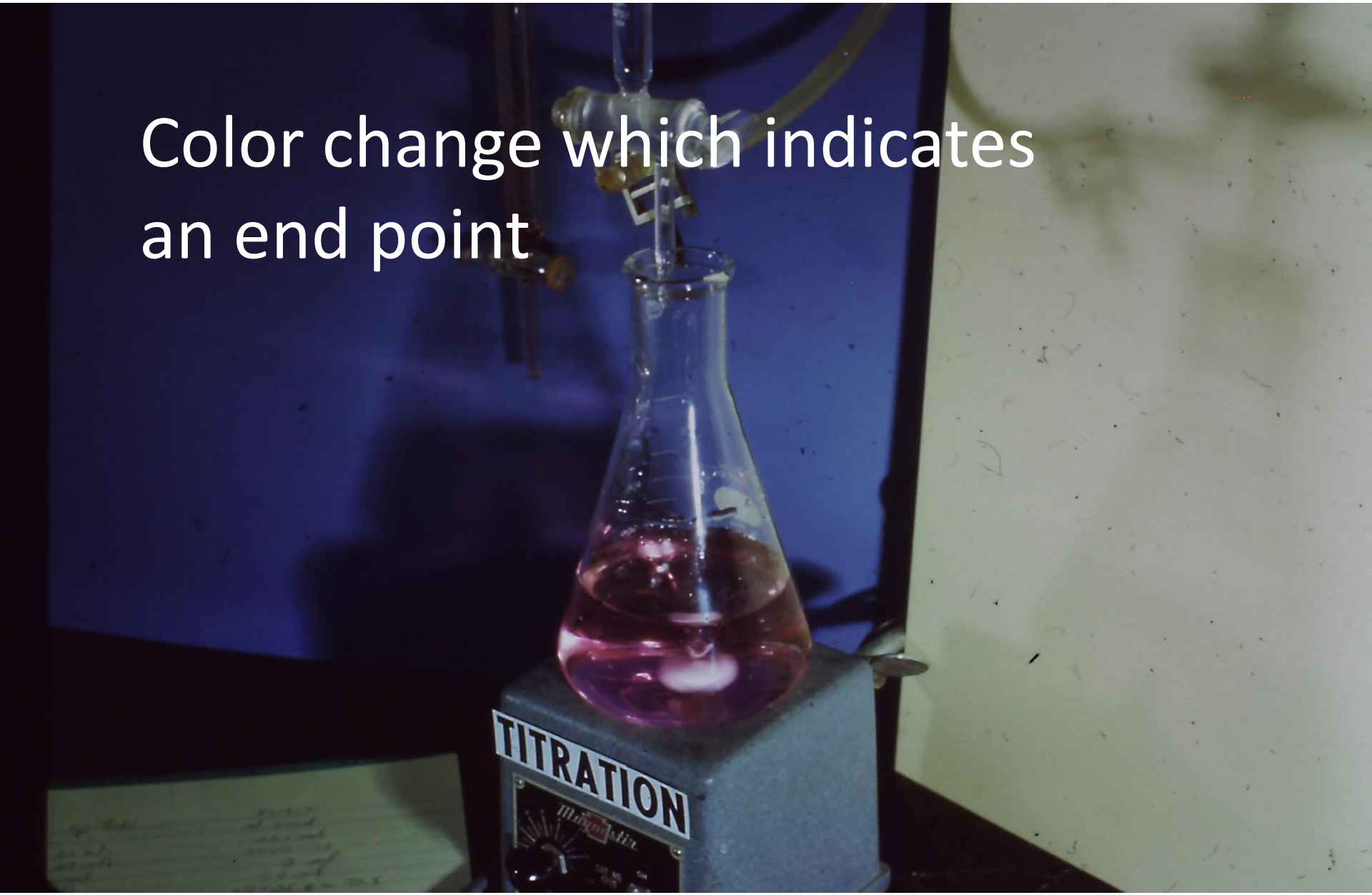
Digestion is followed by distillation




THE AMMONIA + BORIC ACID IS TITRATED WITH HYDROCHOLORIC ACID
The Nitrogen content is multiplied by 6.25 (for meat) to obtain the protein content



Titration with the acid an with the aid of an indicator which causes a color change and considering the concentration of the acid the quantity of Nitrogen can be calculated



Color change which indicates an end point

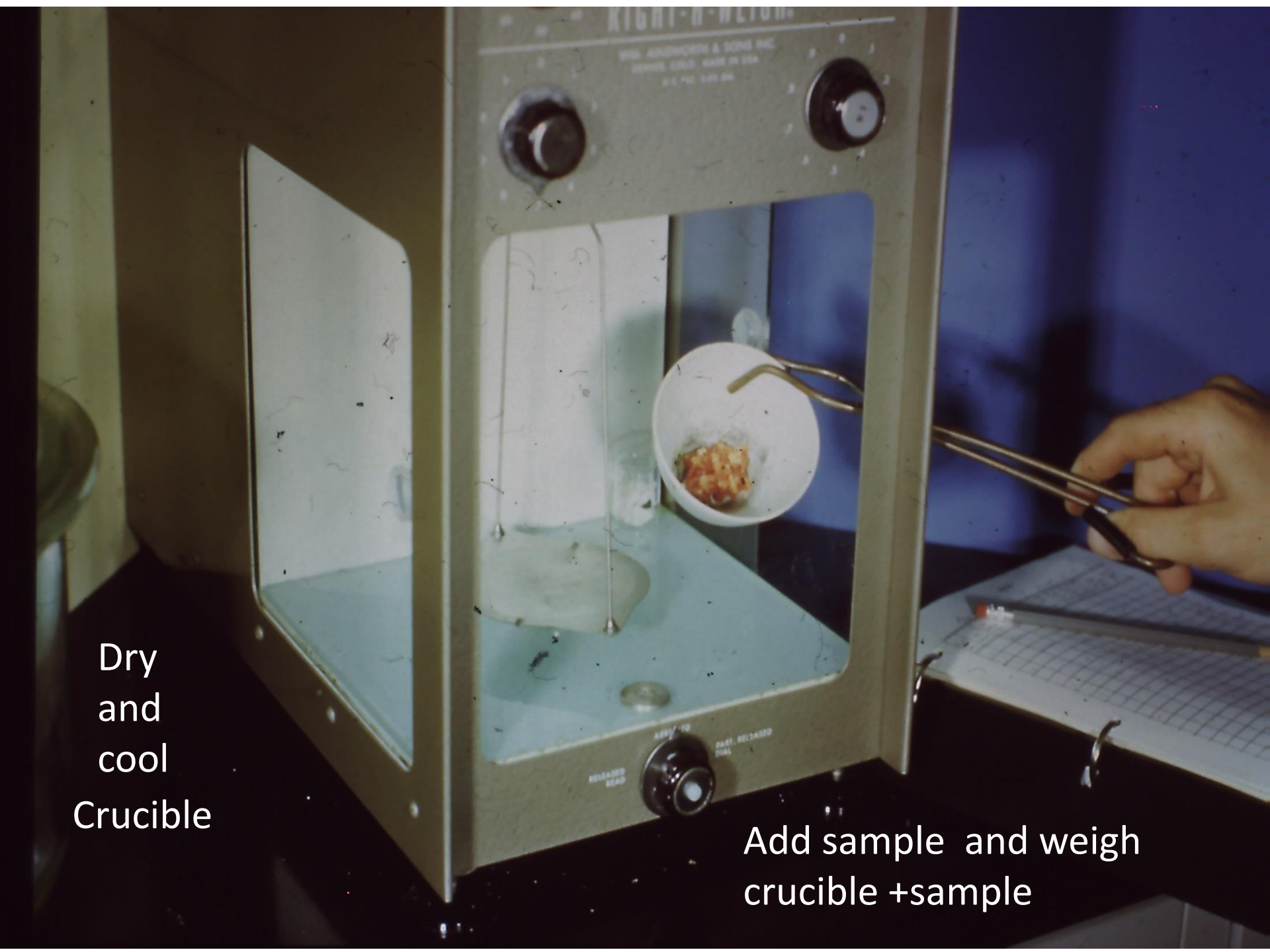
PROTEIN DETERMINATION

Acid Volume - Nitrogen

Nitrogen x 6.25 = Total Protein

$$\frac{\text{Total Protein}}{\text{Sample Weight}} = \% \text{ Protein}$$

PERCENT ASH


Dry
and
cool
Crucible
Add sample and weigh
crucible +sample


Dry
sample
212 F


Heat but do not
catch on fire

Place sample + crucible in high temperature furnace

For 18 HOURS


RIGHT-A-WEIGH
Weigh
crucible
+ ash

ASH DETERMINATION

5.00 g. Wet Weight

0.05 g. Weight after Ashing

$$5.00 \overline{)\, 0.05} \quad 0.01 = 1\% \text{ Ash}$$